

ABSTRACT OF THE DISCLOSURE

A shape memory alloy actuator array comprising a plurality of individually trained shape memory alloy actuators to provide relative movement of different actuator array portions and a thin-film heating element positioned adjacent at least one shape memory alloy actuator to thermally activate the actuator for movement away from its initial shape. A shape memory alloy medical device such as a catheter or a conduit is further provided comprising a lattice network or scaffolding of individually activated and oppositely trained shape memory alloy actuators set with a predetermined shape to provide a full range of directional movement within a body, and a network of thin-film heating elements to selectively activate a combination of actuators for movement or variable stiffness. A method of forming a shape memory alloy actuator array is also provided wherein a plurality of shape memory alloy actuators are formed by removing selected window portions from a single sheet of shape memory alloy along a series of spaced apart rows and columns before individual training with a predetermined shape. A thin-film network of addressable heating elements may further be deposited onto the sheet for selective activation of shape memory alloy actuators within the array.